

LAKE MEAD NATIONAL RECREATION AREA

ENVIRONMENTAL ASSESSMENT

for

Implementation of a Soils Monitoring Study

**Clark County, Nevada
Mohave County, Arizona**

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US Department of the Interior, National Park Service

TABLE OF CONTENTS

SECTION I: PURPOSE OF AND NEED FOR ACTION	1
Introduction.....	1
Purpose and Need	1
Background	3
Project Area- Proposed Study Plot Locations	5
Environmental Assessment	12
Related Laws/ Legislation and Other Planning and Management Documents.....	12
Issues and Impact Topics	15
Issues and Impact Topics Identified for Further Analysis	15
Impact Topics Considered but Dismissed from Further Consideration....	15
SECTION II: DESCRIPTION OF ALTERNATIVES	17
Introduction.....	17
Alternative A (No Action)	17
Alternative B (Preferred)	17
Mitigation and Monitoring.....	18
Natural Resources	18
Soils and Vegetation	18
Special Status Species	18
Air Quality.....	18
Cultural Resources	18
Alternatives Considered but Eliminated from Further Evaluation.....	18
Permit Requirements	18
Environmentally Preferred Alternative.....	19
Comparison of Impacts.....	19
SECTION III: AFFECTED ENVIRONMENT	21
Introduction.....	21
Natural Resources.....	21
Geology, Topography, and Soils	21
Vegetation.....	21
Wildlife.....	22
Special Status Species	22
Air Quality.....	22
Cultural Resources.....	23
Socioeconomic Resources, Park Operations, and Visitor Use.....	24
SECTION IV: ENVIRONMENTAL CONSEQUENCES.....	25
Introduction.....	25
Methodology	25
Criteria and Thresholds for Impact Analysis	25
Geologic Resources and Soils	25
Vegetation.....	26
Wildlife and Wildlife Habitat	27

Air Quality.....	28
Cultural Resources	29
Impairment Analysis.....	31
Cumulative Effects	31
ALTERNATIVE A- No Action	32
Natural Resources	32
Soils and Vegetation	32
Wildlife.....	33
Air Quality.....	33
Cultural Resources	33
ALTERNATIVE B- Preferred Alternative	33
Natural Resources	33
Soils and Vegetation	33
Wildlife.....	34
Air Quality.....	34
Cultural Resources	34
SECTION V: COORDINATION AND CONSULTATION	35
SECTION VI: LIST OF PREPARERS.....	37
SECTION VII: SELECTED REFERENCES.....	39

LIST OF FIGURES

Figure 1. Regional Map	5
Figure 2. Area Map.....	6
Figure 3. Overview of Proposed Study Locations.....	7
Figure 4. Northern Plot Locations	8
Figure 5. North-Central Plot Locations.	9
Figure 6. Southern Plot Locations.	10

LIST OF TABLES

Table 1. Proposed Treatment Locations	11
Table 2. Comparison of Long-Term Impacts.....	19
Table 3. Soil Type and Vegetation.....	21

APPENDICES

Appendix A. Monitoring Protocols for Soil Stability.....	41
Appendix B. Endangered, Threatened, and Candidate Species	57

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SECTION I: PURPOSE OF AND NEED FOR ACTION

Introduction

The National Park Service (NPS) is considering implementing a soils monitoring study at Lake Mead National Recreation Area (NRA). The soils monitoring study, "Monitoring Protocols for Soil Stability at Lake Mead National Recreation Area" (Appendix A), has been proposed by the United States Department of Agriculture, Jornada Experimental Range (USDA), New Mexico State University.

The environmental assessment (EA) evaluates the no action alternative and one action alternative. The alternatives analyzed are: Alternative A: No Action, and Alternative B: Implement a Soils Monitoring Study. This document also includes discussions of alternatives that have been ruled out and justifications for their elimination.

Purpose and Need

In 1998 a Vital Signs monitoring workshop was conducted at Lake Mead NRA. Approximately 55 interdisciplinary scientists were asked to list the most significant threats or stressors to the environment within Lake Mead NRA. They then were asked to provide their professional judgement on the key indicators of ecosystem health that the National Park Service should monitor related to those environmental stressors. The number one recommended parameter for Lake Mead NRA to monitor related to ecosystem health and sustainability was the condition of desert soils and ground disturbances.

In order to initiate the number one recommended monitoring protocol development from the Vital Signs Workshop, Lake Mead NRA requested the assistance of the USDA to conduct a preliminary battery of soils measurements. The objective was to develop initial information that could guide later development of a soils monitoring protocol. During 2000 and 2001 the USDA Jornada Experimental Range Station took soils measurements within areas of existing disturbances related to burro grazing and illegal off-road vehicle tracks. The purpose of these measurements was to evaluate the use of soils indicators related to such disturbances developed in other locations for their potential use as indicators within Lake Mead NRA. These included: soil stability, chlorophyll content (a microbotic crust indicator), penetrometer resistance, and gravel cover. These measurements were taken at over 30 locations containing existing soil disturbance. Also completed was a soils particle size analyses for each location and consultations with the Natural Resource Conservation Service soil scientist who completed the order 3 soils map of Lake Mead NRA in 1999.

The initial results provided information on both the resource impacts of illegal off-road traffic and burros, and on the relevance of possible indicators of overall soils condition. The results from initial measurements also provided some indication of the relative sensitivity of different soils to disturbance.

Initial measurements show that tracks from illegal off-road vehicle use and the establishment of burro trails increased soil compaction and soil erodibility and decreased microbiotic crust density. Significantly higher penetrometer resistance and higher soil erodibility in the tracks strongly suggest that the hydrologic function is impaired, especially during extreme storm events producing large amounts of runoff. It is these events which generate and deliver most of the sediment in arid ecosystems such as Lake Mead NRA, and which cause the most damage to both the land and infrastructure, including the wash out of roads. While it has been shown that the creation of off-road trails impacts increased runoff in more mesic (wetter) ecosystems, there is limited data documenting hydrologic effects for areas similar to Lake Mead NRA. Consequently, there is a management need to evaluate the relative hydrologic and erosion impacts of these activities on different types of soils within Lake Mead NRA.

Controlled, replicated studies of soils responses to creation of illegal off-road trails and burro trails are needed to quantify the short-term and long-term effects of these disturbances on hydrologic runoff and soil susceptibility to erosion for each of the major soil types at Lake Mead NRA. This proposed study would focus on indicator measurements of illegal vehicle tracks and burro trails, and conduct a replicated study of soil indicator responses to the creation of illegal vehicle tracks. The results of this study could be used for park management in the planning and location of new roads, in better maintenance and management of the existing backcountry approved roads system, and to focus efforts for the management of illegal off-road vehicle use by targeting the most sensitive soils for special protection. Additionally, results from this study would be used by park management for overall soils condition assessments, and for the development and prioritization of restoration actions of past burro use and illegal vehicle tracks.

Indicator Development

Two simple cost-effective indicators were identified: the soil stability kit and impact penetrometer. Both are very sensitive to both burro and vehicle disturbances. Results from the soil stability kit test were highly correlated with soil chlorophyll content, indicating that the less expensive stability kit can be used as a surrogate for soil microbiotic crusts, in addition to reflecting soil erodibility.

Initial results show that these two indicators can be meaningful for assessment of overall soils condition related to disturbances. Controlled, replicated studies are needed, however, to quantify the short-term and long-term effects on soil compaction and the susceptibility of the soil to erosion from illegal off-road vehicle traffic, burro trails and similar disturbances for each of the major soil types at Lake Mead NRA. The studies would also help indicate which soil types are the most vulnerable to erosion from such disturbances.. This study proposes further evaluation of indicators in burro trails and illegal vehicle tracks, and a controlled, replicated study of the changes in soils condition indicators from the creation of illegal vehicle tracks.

Three types of information are required to cost-effectively manage the impacts to soils from ground disturbances.

- (1) Site (soil) sensitivity to impacts. There is a need to know which sites would be most negatively impacted, and the relative recovery rate for different sites, in order to focus prevention and mitigation efforts on high sensitivity sites.
- (2) Effects of timing of impacts. Data from cultivated soils limited recent data from rangeland soils, and observations at Lake Mead NRA suggest that wet soils are much more susceptible to long-term damage by compaction. There is a need to know if soil moisture is a critical factor for one or more soils in Lake Mead NRA in order to decide whether or not to focus prevention and mitigation efforts on periods and areas that soils are most likely to be moist.
- (3) Indicator sensitivity. Initial measurements have identified several cost-effective indicators that appear to be highly sensitive to soil disturbances at Lake Mead. However, these indicators have not been quantitatively correlated with changes in the ecosystem functions (runoff and erosion) that they are designed to reflect for the soils in Lake Mead NRA.

Finally, this information must be effectively communicated to both current and future land managers at Lake Mead NRA.

Background

The desert areas of Lake Mead NRA and shorelines of Lakes Mead and Mohave can be accessed by approximately 200 miles of frontcountry roads and 600 miles of approved backcountry roads. These roads are within the Lake Mead NRA approved roads system established by the 1986 General Management Plan. The approved roads system provides recreational use and access for thousands of visitors driving for pleasure, desert exploration, and lake access annually.

Unfortunately, a small percentage of the users of the approved roads system leave the approved roads and illegally create new tracks and trails. Surveys by Lake Mead NRA rehabilitation crews have shown a serious documented increase in illegal off-road vehicle damage over the last several years. While the numbers of vehicles with illegal operations is small in proportion to the total number of vehicles, even a relatively small number can cause significant damage.

In 1999 Lake Mead NRA conducted its first systematic survey of damage from illegal use of off-road vehicles. In the Northshore Road area, the 1999 survey found 42 linear miles of illegal tracks, trails and ruts. A follow-up survey of the same area in 2001 found a total of 60 linear miles of illegal tracks, trails and ruts, or an increase of 43% in two

years. In the Cottonwood Cove region, the 2001 survey found a total of 18 miles of illegal tracks, trails and ruts, an increase of 13% from the 1999 survey of the same region.

Consequences of these ground disturbances are immediate, extensive, serious, and long-term. Mojave Desert soils are stabilized not so much by vascular plants as by cryptobiotic crusts and a mosaic of rock mulch called desert pavement. These protective layers can be completely removed by burro trailing or illegal off-road vehicle activity, exposing underlying soils. The presence of illegal vehicle tracks are a visual invitation for others to do the same.

Exposed soils are subsequently lost to wind and water erosion, removing all nutrients, microbiota, and seed in the process. Disturbances create opportunities for exotic and invasive plants to establish in previously clean areas, and illegal recreational uses can bring the exotic seed source with them. Air-borne dust not only damages human and animal respiratory systems but also deposits on plant leaf area, reducing photosynthesis and productive habitat. Natural recovery after disturbance may take several decades to thousands of years without active restoration or other intervention.

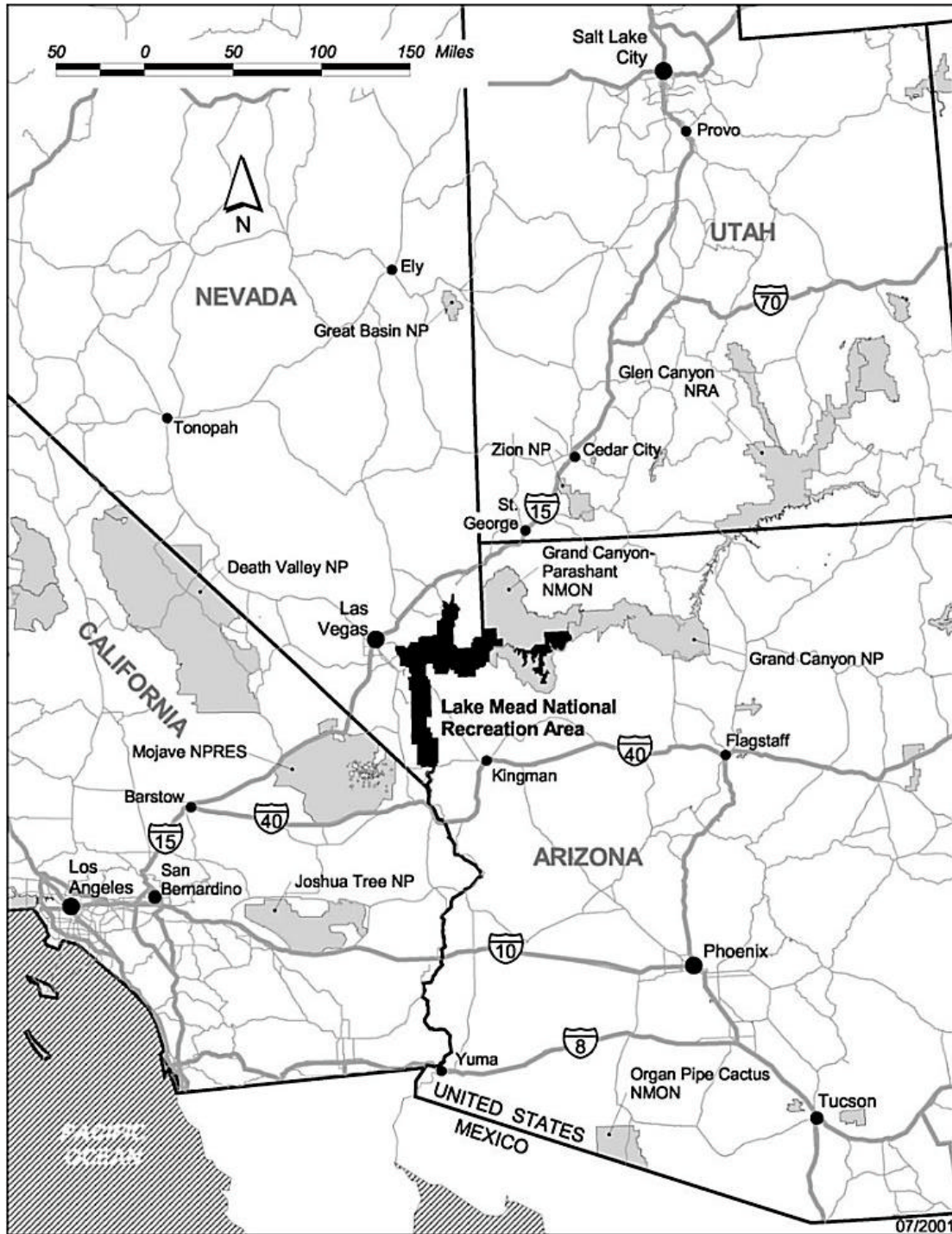
Lake Mead NRA crews have been managing the existing approved roads system to reduce illegal vehicle use by installing strategic barriers, promoting public education, increasing law enforcement activities, establishing a new administrative climate with entrance stations, and implementing enhanced road and habitat restoration projects. However, with more than 800 miles of roads within the recreation area, and 120 linear miles of damage from illegal ORV use, along with limited staff, it is extremely difficult to prioritize project sites for protection and restoration activities.

The 1995 approved Lake Mead NRA Burro Management Plan has identified prescriptions for burro removals and areas within the park which are to be managed for no burro use. The plan, however, does recognize prescribed levels of use in coordination with the Bureau of Land Management in the areas of Gold Butte, Nevada, Muddy Mountains and Bittersprings Valley, Nevada, and the Black Mountains of Arizona. While overall burro use within Lake Mead NRA has declined since 1995, there is a need to continue management within the recognized areas of continued burro use, and to prioritize the restoration of lands within the areas no longer used by burros.

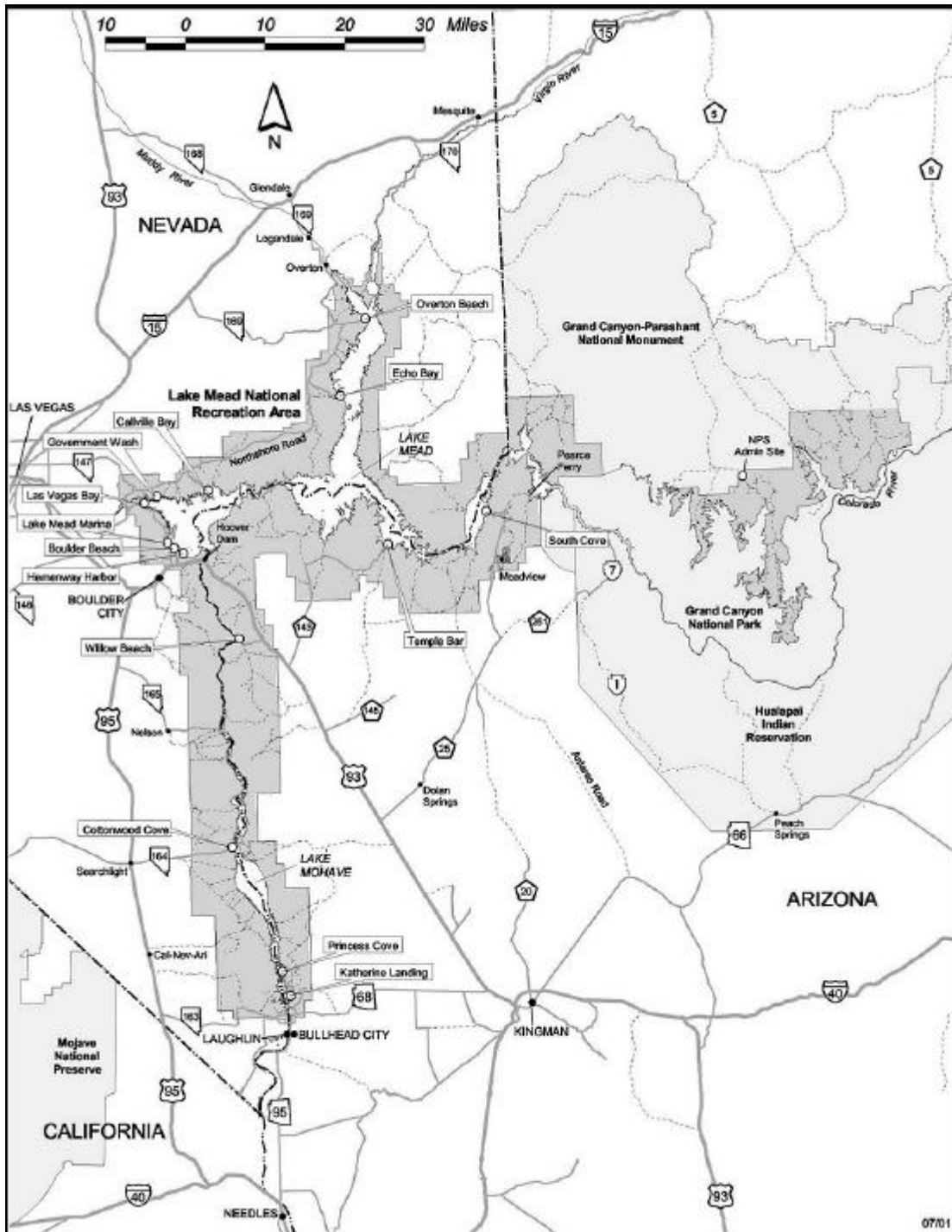
The further evaluation of soils indicators in previously disturbed burro trails and off-road vehicle trails is a part of the proposed study. Those evaluations will involve previously collected data or minor collection of additional data in previously disturbed sites. The controlled, replicate pairing study of off-road vehicle tracks will involve additional disturbances. That study and associated impacts requires the analysis of this environmental assessment.

PROJECT AREA- PROPOSED STUDY PLOT LOCATIONS

The proposed study plots are located at twelve locations within the Nevada portion of Lake Mead NRA (Figures 1-6). Table 1 provides more specific information regarding the proposed treatment locations and the soils present at each location.



**Figure 1. Regional Map
Lake Mead National Recreation Area**



**Figure 2. Area Map
Lake Mead National Recreation Area**

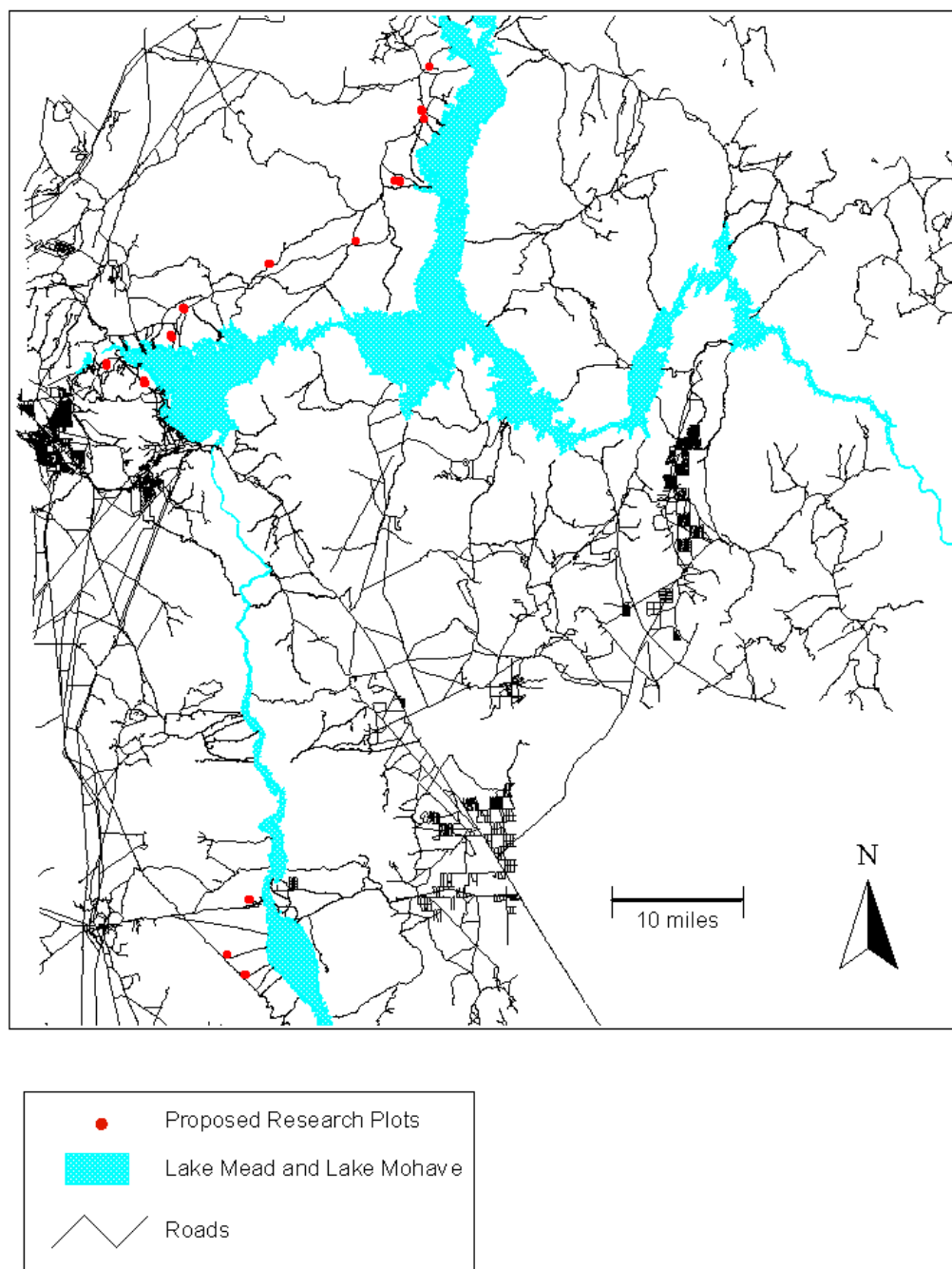


Figure 3. Overview of Proposed Study Plot Locations

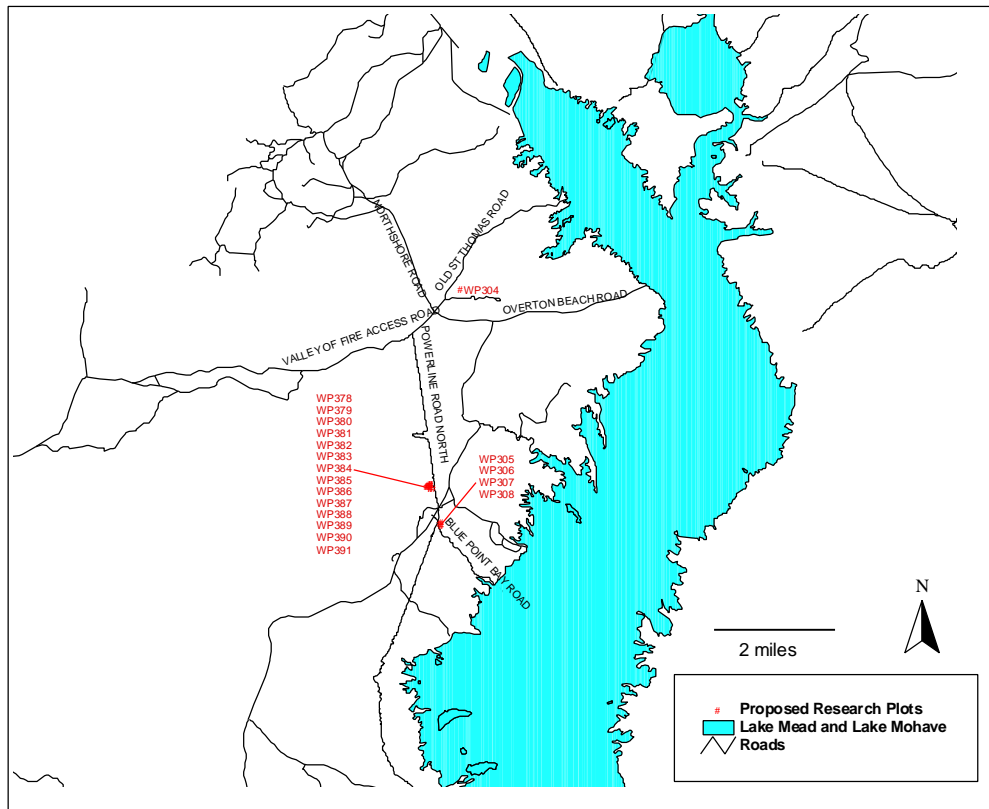


Figure 4. Northern Plot Locations

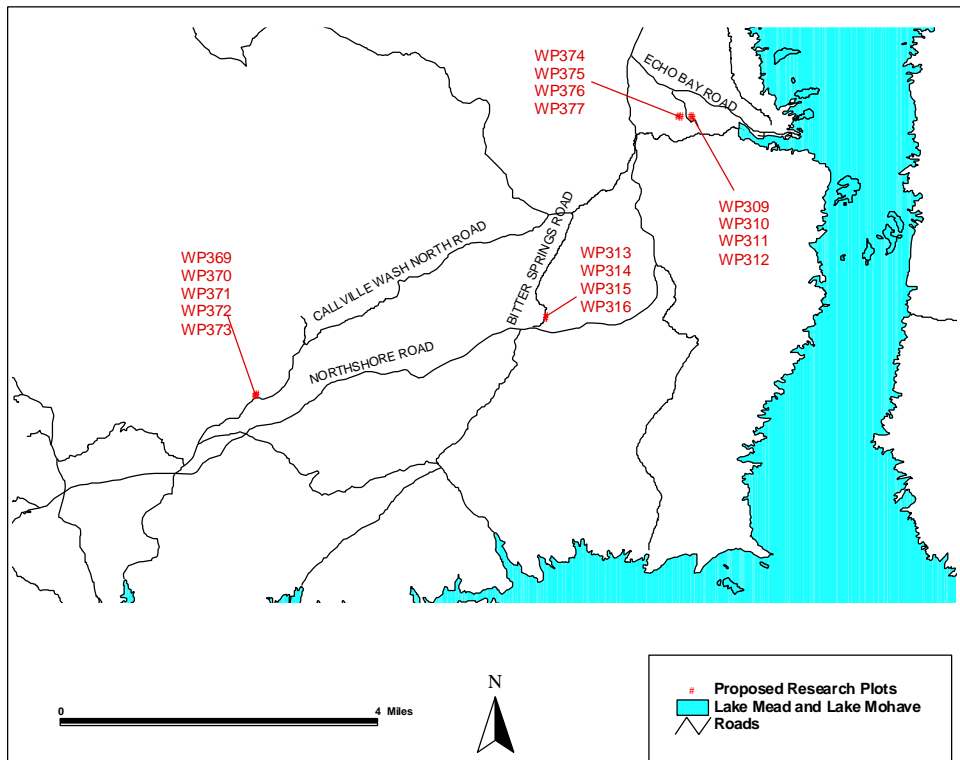


Figure 5. North-Central Plot Locations

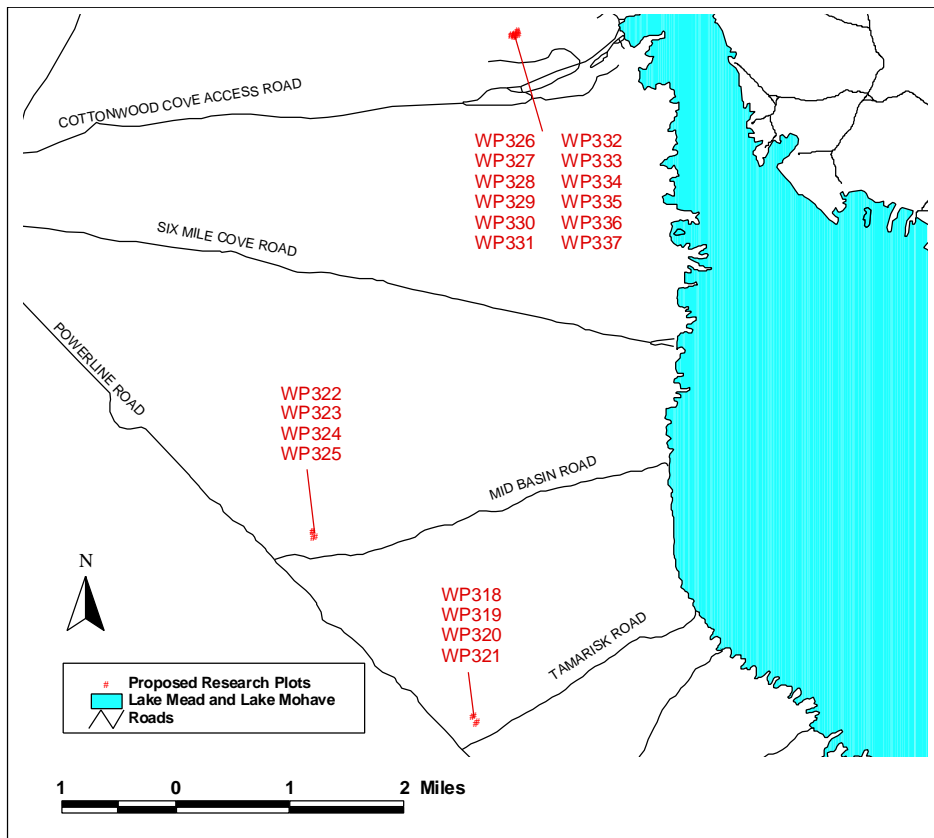


Figure 6. Southern Plot Locations

Table 1. Proposed Treatment Locations

Priority	Site Name	Approximate Location	Soil Series	Slope (%)
1	Tamarisk Road	0.5 km E of Powerline Road on Tamarisk Road	Carrizo	3-5
1	Blue Point Bay Spring Road	0.5 km SE of Blue Pt. Bay Spring on Blue Pt. Bay Road	Drygyp	5
1	Callville Wash Road North	5 km N or AR101 on Callville Wash Road #94	Heleweiser	2-3
2	Airport Flat	Immediately north of airport	Cheme	4-6
2	Callville Wash	Near old Callville Wash Road, on south side of AR101	Gypwash	1-3
2	Cottonwood Cove	Just east of Cottonwood Cove NPS housing site	Huevi	2-3
3	Mid-Basin Road	0.6 km E of Powerline Road on Mid-Basin Road	Carrizo	3-5
3	Airport Gravel Pit	North of airport immediately west of gravel pit	Cheme	15-20
3	Blue Point Bay Spring Powerline	1 km N of Blue Pt. Bay Spring on Powerline Road	Drygyp	10-15
3	Old Dump	At old dump site, 1 km S of Lakeshore Road	Gypwash	5-8
3	Bittersprings Road	0.5 km N of AR101, 200 m E of Bittersprings Road	Heleweiser	5-8
3	Closed Lakeshore Drive	On close Lakeshore Drive, 1 km N of southern gate	Huevi	15-20

ENVIRONMENTAL ASSESSMENT

This EA analyzes the no action and one action alternative and their impacts on the human and natural environment. It outlines project alternatives, describes existing conditions in the project area, and analyzes the effects of each project alternative on the environment. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and regulations of the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] 1508.9) and NPS DO-12.

RELATED LAWS/ LEGISLATION AND OTHER PLANNING AND MANAGEMENT DOCUMENTS

Lake Mead National Recreation Area was established in 1964 (PL 88-639), “for the general purposes of public recreation, benefit, and use, and in a manner that will preserve, develop and enhance, so far as practicable, the recreation potential, and in a manner that will preserve the scenic, historic, scientific, and other important features of the area, consistent with applicable reservations and limitations relating to such area and with other authorized uses of the lands and properties within such area.”

The 1986 *General Management Plan* provided the overall management direction for Lake Mead NRA. It identified the issues related to illegal ORV use and the damage this use can create. The General Management Plan identified basic rehabilitation research needs, including the placement of barriers, marking routes, public information and interpretation, and increased law enforcement.

The *Lake Mead National Recreation Area Resource Management Plan* (NPS 1999) identified the issue of illegal ORV driving. Although it is better managed and enforced, notable incidents still occur and are in need of prevention and restoration. Illegal off-road vehicle incidents is increasing as communities adjacent to the park undergo increasing urbanization.

The *Resource Management Plan* identified illegal ORV use as a stressor to the park environment. Increased urbanization, as well as expanded availability of off-road capable vehicles, has created an increase of illegal off-road driving. Increased use has meant an increase in those who chose to leave the roadway, either to “challenge” their vehicle in hill climbing, or to attempt to forge new roads. This activity is extremely damaging to the fragile and irreplaceable desert soils, and threatens the long-term ecosystem sustainability of the park.

The *Resource Management Plan* included goals including increased scientific assistance to support sound management decisions. The goals of the *Resource Management Plan* are reflected in the *Strategic Plan for Lake Mead National Recreation Area* (2001).

The *Strategic Plan for Lake Mead National Recreation Area* identifies the following goals that relate to disturbed lands, restoration, and research.

Goal 1.a.1.A. (WASO) Disturbed Lands: 5% of targeted acres of Lake Mead NRA targeted parklands, disturbed by prior physical development or agricultural uses, as of 1999, are restored.

Park lands, where natural processes have been significantly altered by past land-use and visitor-use practices, must be restored to their natural condition. Impacts from land-use practices (including disturbances from grazing, roads, illegal off-road driving, mines and other abandoned sites) directly affect other natural resources and can result in severe and persistent changes to habitat conditions and ecosystem functions. By restoring these parklands the park can help accelerate the recovery of biological and physical components of the ecosystem (including soils, vegetation, and the geomorphology and hydrologic settings).

Goal 1.a.10. (LAME) - Illegal Activities/Resource Protection: Damage to park natural and cultural resources from illegal activities is reduced by 10% from the 1997 baseline levels.

This goal addresses the need to protect park natural and cultural resources from any illegal activity occurring within the park boundary. This illegal activity takes many forms and includes such things as illegal off-highway vehicle activity, plant and animal poaching, illegal hunting, vandalism, and hazardous material spills and dumping.

Goal 1.a.10.B. (LAME) -Number of illegal roads and traces seen along Northshore Road do not increase more than 10% in total length from 2000 baseline.

Mission Goal 1b: Management decisions about resources and visitors are based on adequate scholarly and scientific information.

The NPS has fundamental information needs for making decisions about managing natural and cultural resources within Lake Mead NRA. Sound stewardship requires an in-depth knowledge and understanding of basic ecosystem and resource functions and to have a complete understanding of the system, humans and their culture through time must be considered to be a part of that system. This requires good scientific research and consultation with various technical experts.

Lake Mead National Recreation Area is functioning as a healthy system within an acceptable range of variation as part of larger, dynamic regional ecosystems, and with humans and their culture, through time, considered part of the system. Ecosystem management is adopted and protected as a management philosophy, and management plans and strategies have shifted from a park or resource-specific approach to one focusing primarily on broader systems and settings. This means that the park has assessed and identified its multiple ecosystem boundaries and scales (variable zones of influence) tailored to environmental, cultural, social, and economic factors; such as,

watershed, cultural themes, wildlife habitat and floral ranges participating in, and helping facilitate, the development of specific ecosystem vision statements of common, long-term objectives with partners; modified existing plans and planning processes to support ecosystem management and sustainable development and operations with the defined variable zones of influence; information sharing networks are in place for exchange of data within defined zones of influence; the park is fulfilling its government-to-government responsibilities to consult with native peoples and involve them in managing culturally sensitive resources/areas.

The NPS Organic Act directs the NPS to manage units “to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such a manner as will leave them unimpaired for the enjoyment of future generations.” (16 U.S.C. § 1). Congress reiterated this mandate in the Redwood National Park Expansion Act of 1978 by stating that the NPS must conduct its actions in a manner that will ensure no “derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress.” (16 U.S.C. § 1 a-1). The Organic Act prohibits actions that permanently impair park resources unless a law directly and specifically allows for the acts. An action constitutes an impairment when its impacts “harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources and values.” (Management Policies 1.4.3).

NPS Management Policies 2001 requires the analysis of potential effects of each alternative to determine if actions would impair park resources. To determine impairment, the NPS must evaluate “the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts.” (Management Policies 1.4.4). The NPS must always seek ways to avoid or minimize, to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the NPS management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment to the affected resources and values (Management Policies 1.4.3).

NPS units vary based on their enabling legislation, natural and cultural resources, missions, and the recreational opportunities appropriate for each unit, or for areas within each unit. The enabling legislation for Lake Mead NRA (PL 88-639), established the recreation area “for the general purposes of public recreation, benefit, and use, and in a manner that will preserve, develop and enhance, so far as practicable, the recreation potential, and in a manner that will preserve the scenic, historic, scientific, and other important features of the area, consistent with applicable reservations and limitations relating to such area and with other authorized uses of the lands and properties within such area.” An action appropriate at Lake Mead NRA, as designated by the enabling legislation, may impair resources in another unit. This environmental assessment analyzes the context, duration, and intensity of impacts related to the implementation of a soils monitoring study, as well as the potential for resource impairment, as required by

ISSUES AND IMPACT TOPICS

Issues are related to potential environmental effects of project alternatives and were identified by the project interdisciplinary team and through the scoping process. Once issues were identified, they were used to help formulate the alternatives and mitigation measures. Impact topics based on substantive issues, environmental statutes, regulations, and executive orders (EOs) were selected for detailed analysis. A summary of the impact topics and rationale for their inclusion or dismissal is given below.

Issues and Impact Topics Identified for Further Analysis

The following relevant impact topics are analyzed in the EA. Whether each issue is related to taking action or no action is specified.

Natural Resources

Soils and Vegetation: Soils would be disturbed at the project site and access points into the project site. Vegetation could be removed from the project site, or damaged from vehicular access into the project site.

Wildlife: Wildlife could be temporarily displaced from the areas around the study plots due to human disturbance.

Air Quality

Air quality could be temporarily degraded in the area around the study plot due to soil disturbance and the creation of dust.

Cultural Resources

Cultural resources could be damaged or destroyed by activities on the study plots or by vehicles accessing the study plots.

Impact Topics Considered but Dismissed from Further Consideration

There is no potential for impact to the soundscape, socioeconomic resources, and adjacent land uses. All proposed sites were selected based on their potential to avoid wilderness or proposed wilderness, and to avoid impacts to visual resources, wetlands and riparian areas, floodplains, and water resources. Sites have been surveyed and areas of known sensitive, threatened, and endangered species have been avoided. Proposed sites and study periods were selected to avoid areas of visitor use.

The following topics are not further addressed in this document because there are no potential effects to these resources, which are not in the project area:

- Designated ecologically significant or critical areas;
- Wild or scenic rivers;

- Wetlands;
- Floodplains;
- Designated coastal zones;
- Indian Trust Resources;
- Prime and unique agricultural lands;
- Sites on the US Department of the Interior's National Registry of Natural Landmarks; or
- Sole or principal drinking water aquifers.

In addition, there are no potential conflicts between the project and land use plans, policies, or controls (including state, local, or Native American) for the project area.

Regarding energy requirements and conservation potential, construction activities would require the increased use of energy for the construction itself and for transporting materials. However, overall, the energy from petroleum products required to implement action alternatives would be insubstantial when viewed in light of production costs and the effect of the national and worldwide petroleum reserves.

There are no potential effects to local or regional employment, occupation, income changes, or tax base as a result of this project. The project area of effect is not populated and, per EO 12898 on Environmental Justice, there are no potential effects on minorities, Native Americans, women, or the civil liberties (associated with age, race, creed, color, national origin, or sex) of any American citizen. No disproportionate high or adverse effects to minority populations or low-income populations are expected to occur as a result of implementing any alternative.

SECTION II: DESCRIPTION OF ALTERNATIVES

Introduction

This section describes the alternatives considered, including the No Action Alternative. The alternatives described include mitigation measures and monitoring activities proposed to minimize or avoid environmental impacts.

Alternative A- No Action

No soils monitoring program would be initiated at Lake Mead NRA.

Alternative B- Initiate Soils Monitoring Program at Lake Mead NRA

The project includes establishing a replicated experiment (randomized complete block with eight blocks) at up to twelve locations in the Lake Mead NRA representing up to six representative soil types (Table 1). Where possible, selected sites would represent the range of slope variability for each soil. In addition to allowing a representative of a broader range of slopes, data from two sites would help identify any results which might be anomalous.

There would be three treatments: control, vehicle track on dry soil, and vehicle track on wet soil. At each site, eight sets of pairs of tracks would be established. Each pair of tracks would be generated by one pass of a four-wheel drive jeep or sport-utility vehicle. For each pass, one track would be on soil that is wet to a depth of at least 10 cm (4 inches). The other would be on dry soil. The soil would be damped with water pumped from a tank located on a truck parked on the access to the site. Water would be pumped up to 500 feet if necessary to minimize additional disturbance to the site.

Measurements would be completed on eight pairs of tracks plus eight controls at each site.

- (1) Rainfall simulation
 - a. Sediment generation
 - b. Runoff
 - c. Infiltration
- (2) Soil stability (using field kit)
- (3) Chlorophyll content of soil surface
- (4) Penetrometer resistance
- (5) Bulk density
- (6) Rock cover by size class
- (7) Soil texture and rock content of soil surface

Mitigation and Monitoring

Mitigation measures are specific actions designed to minimize, reduce, or eliminate impacts of alternatives and to protect Lake Mead NRA resources and visitors.

Monitoring activities are actions to be implemented during or following the project. The following mitigation related to the soils monitoring study would be implemented under the preferred alternative, and are assumed in the analysis of effects for each alternative.

Natural Resources

Soils and Vegetation: Any tracks to the project site would be eradicated after the initial study. Monitoring would be done to assess site recovery. After the conclusion of the project, the project lead would reestablish the site contour, rake any tracks, and refill holes to leave the terrain similar to the surrounding area. The project manager would record any vegetation that is removed as part of the project, and this vegetation would be replaced after project completion.

Special Status Species: Even though sites were selected to avoid areas where sensitive, threatened, and endangered species occur, they will be surveyed again by National Park Service biologists prior to initiating any action.. The only species of concern in the proposed site areas is the desert tortoise. Desert tortoise training will be provided to all individuals involved with this project. If desert tortoise or burrows are found in the study sites, the site locations will be slightly modified to avoid any impact to these species.

Air Quality: The project manager would avoid windy days when conducting the study to prevent localized dust from blowing into other areas.

Cultural Resources

All study plots and access routes will be inventoried for cultural resources by a qualified NPS staff archeologist. Should unknown cultural resources be uncovered during monitoring, testing would be halted in the discovery area and the monitoring plot would be relocated to avoid any impacts to cultural resources. Lake Mead NRA staff will consult according to 36 CFR 800.11 and, as appropriate, provisions of the Native American Graves Protection and Repatriation Act of 1990.

The NPS will consult with appropriate Native American groups as required by the various laws, regulations, and executive orders. The Lake Mead NRA staff will notify and consult concerned tribal representatives for the proper treatment of human remains, funerary, and sacred objects, should these be discovered during the course of this monitoring project.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER EVALUATION

There were no other alternatives considered for this project.

PERMIT REQUIREMENTS

A National Park Service collection permit is required and would be obtained prior to the soils monitoring project.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is the alternative that will promote NEPA, as expressed in Section 101 of NEPA. This alternative will satisfy the following requirements:

- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- Assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;
- Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable or unintended consequences;
- Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
- Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and,
- Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Alternative B is the environmentally preferable alternative because overall it would best meet the requirements in Section 101 of NEPA. It would provide for the protection and preservation of the natural resources, including the Mojave Desert ecosystem. It would provide information to park managers to make better decisions and set priorities for the protection of the recreation area resources, and fulfill the responsibilities of trustee for future generations.

Comparison of Impacts

Table 2 summarizes the potential long-term impacts of the proposed alternative. Short-term impacts are not included in this table, but are analyzed in the Environmental Consequences section. Impact intensity, context, and duration are also defined in the Environmental Consequences section.

Table 2. Comparison of Long-term Impacts

Impact Topic	Alternative A	Alternative B
Vegetation and Soils	No long-term impacts	Potential long-term beneficial impacts
Wildlife	No long-term impacts	No long-term impacts
Special Status Species	No impacts	No impacts
Air Quality	No long-term impacts	No long-term impacts
Cultural Resources	No long-term impacts	No long term impacts

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SECTION III: AFFECTED ENVIRONMENT

Introduction

This section provides a description of the existing environment in the project area and the resources that may be affected by the proposals and alternatives under consideration. Complete and detailed descriptions of the environment and existing use at Lake Mead NRA is found in the *Lake Mead NRA Resource Management Plan* (NPS 1999) and the *Lake Mead NRA General Management Plan* (NPS 1986).

Natural Resources

Three of America's four desert ecosystems, the Mojave, the Great Basin, and the Sonoran Deserts, meet in Lake Mead NRA. The project areas are characteristic of the Mojave Desert, with low precipitation (averaging 8 to 23 centimeters per year [3 to 9 inches per year]), low humidity, and wide extremes in daily temperatures. Winters are relatively short and mild, and summers are long and hot. The prevailing wind direction is from the south.

Geology, Topography, and Soils. The majority of Lake Mead NRA is characterized by generally north-south trending mountain ranges separated by broad, shallow valleys. The soil types vary in the proposed project areas. The sites were purposely selected to include the six primary soil types at Lake Mead NRA, and include the following soil series: Carrizo, Drygyp, Heleweiser, Chem, Gypwash, and Huevi.

Vegetation. The vegetation in the project areas is dependent upon the soil types in these areas. The following table briefly describes the soil type and its associated vegetation.

Table 3. Soil Type and Vegetation

Soil Type	Brief Description	Associated Vegetation
Carrizo	Deep, excessively drained soils formed in stratified alluvium, on floodplains and alluvial fans.	Sparse growth of cactus, creosote bush, white bursage, mesquite.
Drygyp	Very shallow to a petrogypsic horizon, somewhat excessively drained soils that formed in alluvium derived from gypsum rock.	Mainly creosote bush, white bursage, range ratany, catclaw, Mormon tea, and big galleta.
Heleweiser	Very deep , somewhat excessively drained soils formed in alluvium derived from basalt, sandstone, and limestone.	Mainly creosote bush, white bursage, range ratany, and big galleta.

Chem	Very shallow and shallow over a duripan, well-drained soils on fan remnants, formed in alluvium from mixed rocks over semi-consolidated gravelly sediments.	Mainly creosote bush, white bursage, ratany, white brittlebush, and red brome.
Gypwash	Very deep, somewhat excessively drained soils that formed in alluvium derived dominantly from limestone.	Mainly white bursage and creosote bush.
Huevi	Very deep, well drained soils that formed in semi-consolidated alluvium from mixed rock sources.	Mainly creosote bush, range ratany, and various annuals.

Wildlife. Wildlife in the project areas are typical desert wildlife, including ground squirrels, coyote, small reptiles, and birds.

Special Status Species. NPS biologists conducted on-site surveys on each study plot and consulted the most recent listing of Endangered, Threatened, and Candidate Species for Nevada, prepared by the USFWS (Appendix B) and determined no effect. The only species that occurs in the area is the desert tortoise. There are no federally listed plant species known to occur in the recreation area. Sensitive plant species occur in the recreation area, but sites were specifically selected to avoid areas where sensitive plants occur.

Air Quality. The NPS, Air Resources Division and USFWS, Air Quality Branch together have responsibility for approximately 378 park units and 503 refuges, for which the Clean Air Act designates Class I and Class II air quality area. Class I includes the following areas that were in existence as of August 7, 1977; national parks over 2,428 hectares (6,000 acres), national wilderness areas and national memorial parks over 2,024 hectares (5,000 acres), and international parks. Class II areas are parts of the country protected under the Clean Air Act but identified for somewhat less stringent protection from air pollution damage than a Class I area, except in specified cases (NPS 2001a). Lake Mead NRA is designated as a Class II air quality area, and air quality in the region is generally good. Most reductions in air quality are due to air flows from the Las Vegas Valley west of Lake Mead NRA.

Clean Air Act Conformity Requirements: The EPA has promulgated rules that establish conformity analysis procedures for transportation-related actions and for other (general) federal agency actions. The EPA general conformity rule requires a formal conformity determination document for federally sponsored or funded actions in non-attainment areas or in certain designated maintenance areas when the total direct and indirect net emissions of non-attainment pollutants (or their precursors) exceed specified *de minimis* levels. Since the project area is not within a non-attainment area, Clean Air Act conformity does not apply.

Cultural Resources

Historic Overview: Prehistory. Archeologists have identified a series of Native American cultures that have occupied Lake Mead National Recreation Area and adjacent areas in southern Nevada and Western Arizona over the last 12,000 to 13,000 year. These cultures have been divided into discrete time periods based on various criteria, i.e. changes in technology, the types of animal and plant foods used, or the migration of peoples into and out of the area.

Occupation of the area began at the end of the late Pleistocene around 12,000 to 13,000 years ago with the Paleoindian period. The Paleoindian period lasted into the Holocene and ended around 7,000 before present (BP). The Pleistocene was dominated by greater rainfall and moderate temperature, which created an environment of vast lakes and humid conditions. During the Paleoindian period of the early Holocene, the environment was characterized by a general trend to warmer and dryer conditions. Paleoindian peoples lived in small, highly nomadic groups, utilized wild plant foods, and hunted now extinct big game. Physical remains from the Paleoindian period usually consist of flaked stone tools and the by products of tool manufacture, e.g. flakes and spent cores.

The Archaic period (7,000 to 2,000 [BP]) is characterized by nomadic peoples living in small groups adapted to the mosaic of microenvironments created by the overall warmer and dryer conditions. Their subsistence was based on gathering wild plant foods and hunting small game. Flaked stone tools and the by products of tool manufacture, along with the common occurrence of ground stone artifacts, typify the Archaic period.

The arrival of Anasazi peoples from the east marked the end of the Archaic period and the beginning of the Saratoga Springs period. The Saratoga Springs period (2,000 to 750 BP) was dominated by the expansion of the Virgin Anasazi into the Lake Mead area, and their eventual withdrawal. The Virgin Anasazi were Puebloan peoples who used pottery and lived in permanent structures, which changed from pithouses to above-ground Puebloan-type room structures. They practiced some horticulture but still depended heavily on wild plant and animal foods.

The Late Prehistoric lifeway, which began around 750 BP, was similar to Archaic adaptations. The people lived in small mobile groups, gathered wild plant foods, and hunted small game. They also practiced small-scale horticulture. Archaeologically, these people are indistinguishable from the Mojave, Quechan, Hualapai, and Havasupai (Yuman-speaking peoples) and the Southern Paiute (Numic-speaking peoples) who occupied the area during the Historic period.

Euro-American History. The Spanish and later the Mexicans were the first whites to explore the area. During the Spanish/Mexican period (1500s to 1840s) trade routes were established between the population centers in New Mexico and the colonies in California. These trade routes included the Mojave Trail and the Old Spanish Trail, which passed through Southern Nevada.

The Mormons were the first to establish permanent white settlements in Southern Nevada. These included Las Vegas, St. Thomas, and Callville, the latter two of which were inundated by Lake Mead. During the late 1800s and early 1900s, the prosperity of these communities and others in the area was determined by the boom and bust cycles of the mining and ranching industries that formed the economic base of the area.

The construction of Hoover Dam in the 1930s dramatically changed the landscape of southern Nevada and Western Arizona. It brought thousands of people to the area, put Las Vegas on the map, and helped develop the area's current economy based on recreation and tourism.

Socioeconomic Resources, Park Operations, and Visitor Use

Lake Mead NRA was designated as the first NRA in 1964. It is composed of 595,041 hectares (1,470,328 acres) of federal land and 10,254 hectares (25,338 acres) of nonfederal land, for a total of approximately 605,296 hectares (1.5 million acres) (NPS 2001c). Lake Mead NRA users include boaters, swimmers, fishermen, hikers, photographers, roadside sightseers, backpackers, and campers. Recreation visits in 1999 totaled just over nine million (NPS 2001c).

SECTION IV: ENVIRONMENTAL CONSEQUENCES

Introduction

This section presents the likely beneficial and adverse effects to the natural and human environment that would result from implementing the alternatives under consideration. This section describes short-term and long-term effects, direct and indirect effects, cumulative effects, and the potential for each alternative to impair park resources. Interpretation of impacts in terms of their duration, intensity (or magnitude), and context (local, regional, or national effects) are provided where possible.

Methodology

This section contains the environmental impacts, including direct and indirect effects and their significance to the alternatives. It also assumes that the mitigation identified in the *Mitigation and Monitoring* section of this EA would be implemented under any of the applicable alternatives, as identified in each mitigation criteria.

Impact analyses and conclusions are based on NPS staff knowledge of resources and the project area, review of existing literature, and information provided by experts in the NPS or other agencies. Any impacts described in this section are based on preliminary design of the alternatives under consideration. Effects are quantified where possible; in the absence of quantitative data, best professional judgment prevailed.

Criteria and Thresholds for Impact Analysis

The following are laws, regulations, and/ or guidance that relates to the evaluation of each impact topic.

Geologic Resources and Soils

Related Laws, Regulations, and Policies: NPS Management Policies (4.8) stipulates that the NPS will preserve and protect geologic resources as integral components of park natural systems. Geologic resources includes geologic features and geologic processes. The fundamental policy, as stated in the NPS *Natural Resources Management Guideline* (NPS-77) is the preservation of the geologic resources of parks in their natural condition whenever possible.

Soil resources would be protected by preventing or minimizing adverse potentially irreversible impacts on soils, in accordance with NPS *Management Policies*. NPS-77 specified objectives for each management zone for soil resources management. These management objectives are defined as: (1) natural zone- preserve natural soils and the processes of soil genesis in a condition undisturbed by humans; (2) cultural zone- conserve soil resources to the extent possible consistent with maintenance of the historic and cultural scene and prevent soil erosion wherever possible; (3) park development zone- ensure that developments and their management are consistent with soil limitations

and soil conservation practices; and, (4) special use zone- minimize soil loss and disturbance caused by special use activities, and ensure that soils retain their productivity and potential for reclamation.

Zones within the recreation area have been designated in the Lake Mead NRA General Management Plan, which provides the overall guidance and management direction for Lake Mead NRA.

Impact Indicators, Criteria, and Methodology: The following impact thresholds were established for the project area.

- *Negligible impacts:* Impacts have no measurable or perceptible changes in soil structure and occur in a relatively small area.
- *Minor impacts:* Impacts are measurable or perceptible, but localized in a relatively small area. The overall soil structure would not be affected.
- *Moderate impacts:* Impacts would be localized and small in size, but would cause a permanent change in the soil structure in that particular area.
- *Major impacts:* Impact to the soil structure would be substantial, highly noticeable, and permanent.
- *Impairment:* For this analysis, impairment is considered a permanent change in a large portion of the overall acreage of the park, affecting the resource to the point that the park's purpose could not be fulfilled and the resource would be degraded precluding the enjoyment of future generations.

Vegetation

Related Laws, Regulations, and Policies: The NPS Organic Act directs the park to conserve the scenery and the natural objects unimpaired for future generations. NPS *Management Policies* defines the general principles for managing biological resources as maintaining all native plants and animals as part of the natural ecosystem. When NPS management actions cause native vegetation to be removed, then the NPS will seek to ensure that such removals will not cause unacceptable impacts to native resource, natural process, or other park resources.

Exotic species, also referred to as non-native or alien, are not a natural component of the ecosystem. They are managed, up to and including eradication, under the criteria specified in *Management Policies* and NPS-77.

Impact Indicators, Criteria, and Methodology: The impacts of vegetation were evaluated in terms of impacts to native vegetation and non-native vegetation. The following were used in interpreting the level of impact to vegetation:

- *Negligible impacts:* Impacts have no measurable or perceptible changes in plant community size, integrity, or continuity.
- *Minor impacts:* Impacts are measurable or perceptible and localized within a relatively small area. The overall viability of the plant community would not be affected and, if left alone, would recover.
- *Moderate impacts:* Impacts would cause a change in the plant community (e.g. abundance, distribution, quantity, or quality); however, the impact would remain localized.
- *Major impacts:* Impacts to the plant community would be substantial, highly noticeable, and permanent.
- *Impairment:* The impact would contribute substantially to the deterioration of the park's native vegetation. These resources would be affected over the long-term to the point that the park's purpose (Enabling Legislation, *General Management Plan*, *Strategic Plan*) could not be fulfilled and resource could not be experienced and enjoyed by future generations.

Wildlife and Wildlife Habitat

Related Laws, Regulations, and Policies: The NPS Organic Act, which directs parks to conserve wildlife unimpaired for future generations, is interpreted by the NPS to mean native animal life should be protected and perpetuated as part of the recreation area's natural ecosystem. Natural processes are relied on to control populations of native species to the greatest extent possible. The restoration of native species is a high priority. Management goals for wildlife include maintaining components and processes of naturally evolving park ecosystems, including natural abundance, diversity, and ecological integrity of plants and animals.

The recreation area also manages and monitors wildlife cooperatively with the Arizona Game and Fish department and the Nevada Division of Wildlife.

Impact Indicators, Criteria, and Methodology: The impacts of wildlife were evaluated in terms of impacts to individual animals and wildlife habitat. Specific localized impacts were estimated based on knowledge garnered from similar past activities.

The following are standards used by the NPS in interpreting the level of impact to wildlife:

- *Negligible impacts:* No species of concern is present; no impacts or impacts with only temporary effects are expected.
- *Minor impacts:* Nonbreeding animals of concern are present, but only in low numbers. Habitat is not critical for survival; other habitat is available nearby.

Occasional flight responses by wildlife are expected, but without interference with feeding, reproduction, or other activities necessary for survival.

- *Moderate impacts:* Breeding animals of concern are present; animals are present during particularly vulnerable life-stages, such as migration or winter; mortality or interference with activities necessary for survival expected on an occasional basis, but not expected to threaten the continued existence of the species in the park.
- *Major impacts:* Breeding animals are present in relatively high numbers, and/or wildlife is present during particularly vulnerable life stages. Habitat targeted by actions has a history of use by wildlife during critical periods, but there is suitable habitat for use nearby. Few incidents of mortality could occur, but the continued survival of the species is not at risk.
- *Impairment:* The impact would contribute substantially to the deterioration of natural resources to the extent that the park's wildlife and habitat would no longer function as a natural system. Wildlife and its habitat would be affected over the long-term to the point that the park's purpose (Enabling Legislation, *General Management Plan*, *Strategic Plan*) could not be fulfilled and resource could not be experienced and enjoyed by future generations.

Air Quality

Related Laws, Regulations, and Policies: Air pollution sources within parks must comply with all federal, state, and local regulations. The regulations and policies that govern pollutants of concern are discussed briefly below.

Lake Mead NRA is designated as a Class II Air Quality area under the Clean Air Act. The main purpose of this act is to protect and enhance the nation's air quality to promote the public health and welfare. The act establishes specific programs to provide protection for air resources and values, including the program to prevent significant deterioration of air quality in clean air regions of the country. Although Lake Mead NRA is designated as a Class II Air Quality area, the park strives to maintain the highest air quality standards, and project work within the recreation area is completed in accordance with regional standards. However, the recreation area does not possess sufficient autonomous authority to address issues of air quality improvements when air pollution originates outside the boundaries.

NPS Management Policies direct parks to seek to perpetuate the best possible air quality to preserve natural and cultural resources, sustain visitor enjoyment, human health, and preserve scenic vistas (4.7). Parks are directed to comply with all federal, state, and local air quality regulations and permitting requirements. In cases of doubt as to the impacts of existing or potential air pollution on park resources, the NPS "will err on the side of protecting air quality and related values for future generations."

Impact Indicators, Criteria, and Methodology: Information from the literature was used to assess probable impacts to air quality. There are four impact categories relevant to air quality issues: negligible, minor, moderate and major. Each category is discussed below relative to potential airborne pollution impacts from the alternatives on park resources and human health.

- *Negligible impacts:* Dust can be controlled by mitigation.
- *Minor impacts:* Dust from use the dirt roads is visible during brief periods. Dust is visible only during the work period, but most can be controlled by mitigation.
- *Moderate impacts:* Dust from the use of dirt roads is visible for an extended area. Dust from project activities is visible for an extended area for an extended period, but is reduced by mitigation.
- *Major impacts:* Dust from the use of dirt roads and project activities is visible for an extended period for an extended amount of time, and mitigation is unable to alleviate the conditions.

Cultural Resources

Related Laws, Regulations, and Policies: Numerous legislative acts, regulations, and NPS policies provide direction for the protection, preservation, and management of cultural resource on public lands. Further, these laws and policies establish what must be considered in general management planning and how cultural resources must be managed in future undertakings resulting from the approved plan regardless of the final Alternative chosen. Applicable laws and regulations include the NPS Organic Act (1916), the Antiquities Act of 1906, the National Historic Preservation Act of 1966 (1992, as amended), the National Environmental Policy Act of 1969, the National Parks and Recreation Act of 1978, the Archeological Resource Protection Act of 1979, the Native American Graves Protection and Repatriation Act of 1990, and the Curation of Federally Owned and Administered Archeological Collections (1991).

Applicable agency policies relevant to cultural resources include Chapter 5 of NPS Management Policies, and the Cultural Resource Management Guideline (DO-28), as well as other related policy directives such as the NPS Museum Handbook, the NPS Manual for Museums, and Interpretation and Visitor Services Guidelines (NPS-26).

In addition, consultation with Native American groups is required under the Executive Memorandum of April 29, 1994, Government to Government Relations with Native American Tribal Governments; Executive Order 13007 of May 24, 1996, Indian Sacred Sites; and, Executive Order of May 14, 1998, Consultation and Coordination with Indian Tribal Governments.

Impact Indicators, Criteria, and Methodology: Impacts on cultural resources were developed based on existing conditions, current regulations, and likely development trends. The inventory of archeological resources in the park is largely incomplete. For purposes of assessing impacts, all unrecorded resources are considered potentially eligible for listing on the National Register of Historic Places.

The park's inventory of standing structures and cultural landscapes is relatively complete, however, many structures and landscapes still require evaluation to determine their eligibility for listing on the National Register of Historic Places. For purposes of assessing potential impacts to these properties, unevaluated structures and landscapes are assumed to be potentially eligible.

Under section 106, only historic resources that are eligible or are listed on the National Register of Historic Places are considered for impacts. An impact, or effect, to a property occurs if a proposed action would alter in any way the characteristics that qualify it for inclusion on the register. If the proposed action would diminish the integrity of any of these characteristics, it is considered to be an adverse effect.

For the purposes of this document, the level of impacts to cultural resources was accomplished using the following criteria:

- *Negligible impacts:* No potentially eligible or listed properties are present; no direct or indirect impacts.
- *Minor impacts:* Potentially eligible or listed properties are present; no direct impacts or impacts with only temporary effects are expected.
- *Moderate impacts:* Potentially eligible or listed properties are present; indirect impacts or, in the case of structures, where activity is limited to rehabilitation conducted in a manner that preserves the historical and architectural value of the property.
- *Major impacts:* Potentially eligible or listed properties present; direct impacts including physical destruction, damage, or alteration of a property. Isolation of a property from or alteration of all or part of a property. Isolation of a property from or alteration of the character of a property's setting when that character contributes to its eligibility, including removal from its historic location. Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting. Neglect of a property resulting in its deterioration or destruction (36 CFR 800.5).
- *Impairment:* Loss, destruction, or degradation of a cultural property, resource, or value to the point that it negatively affects the park's purpose and visitor experience.

In the absence of quantitative data concerning the full extent of actions under a proposed alternative, best professional judgement prevailed.

IMPAIRMENT ANALYSIS

In addition to determining the environmental consequences of the alternatives, NPS *Management Policies* 2001, requires the analysis of potential effects to determine if actions would impair park resources. Under the NPS Organic Act and the General Authorities Act, as amended, the NPS may not allow the impairment of park resources and values except as authorized specifically by Congress. The NPS must always seek ways to avoid or minimize, to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the NPS management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment to the affected resources and values (Management Policies 1.4.3).

Impairment to park resources and values has been analyzed within this document. Impairment is an impact that, in the professional judgement of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact would be more likely to constitute an impairment to the extent that it affects a resource or value whose conservation is necessary to fulfill specific purposes identified in the enabling legislation or proclamation of the park; is the key to the cultural or natural integrity of the park or to opportunities for enjoyment of the park; or as identified as a goal in the park's general management plan or other relevant NPS planning document. An impact would be less likely to constitute an impairment to the extent that it is an unavoidable result, which cannot be reasonably further mitigated, of an action necessary to preserve or restore the integrity of park resources or values.

Cumulative Effects

Cumulative effects are the direct and indirect effects of a proposed project alternative's incremental impacts when they are added to other past, present, and reasonably foreseeable actions, regardless of who carries out the action (40 CFR Part 1508.7). Guidance for implementing NEPA (Public Law 91-190, 1970) requires that federal agencies identify the temporal and geographic boundaries within which they will evaluate potential cumulative effects of an action and the specific past, present, and reasonably foreseeable projects that will be analyzed. This includes potential actions within and outside the recreation area boundary. The geographical boundaries of analysis vary depending on the impact topic and potential effects. While this information may be inexact at this time, major sources of impacts have been assessed as accurately and completely as possible, using all available data.

Projects with the potential to cumulatively affect the resources (impact topics) evaluated for the soils monitoring study are identified in below. Some impact topics would be affected by several or all of the described activities, while others could be affected very little or not at all. How each alternative would incrementally contribute to potential

impacts for a resource is included in the cumulative effects discussion for each impact topic.

The growth of the Las Vegas Valley is considered when evaluating the cumulative impacts of the preferred alternative. The Las Vegas Valley was developed in conjunction with the railroads in the early 1900s. After that, the establishment of legalized gambling in 1910, construction of the Hoover Dam in 1935, and World War II continued to promote urban growth. During the 1930s, Las Vegas was a small railroad town with a population of just over 5,000. By 1960, Las Vegas' population was over 64,000 (Clark County's was 127,000), and by 1980 it was approximately 164,000 (Clark County's was 463,000). Starting in the mid-1980s, annual population increases averaging nearly seven percent caused Las Vegas' population to almost double between 1985 and 1995, increasing from about 186,000 to 368,000, a 97.6% increase. At the same time, Clark County's population increased from 562,000 to 1,036,000, an increase of 84.3% (NPS 2001a). The July 2000 population estimate for Las Vegas was 482,874 (NPS 2001a). The latest population prediction in the Las Vegas Valley is for two million people by 2005 (NPS 2001a).

With the predicted increases in population in the local area, and continuing visitation from California and Arizona, park visitation will continue to increase above the current 8 to 10 million visitors per year. As visitation increases, more recreational opportunities are sought, including increased use of approved backcountry roads. With this increased use comes the potential for increased illegal ORV use.

Lake Mead NRA will continue to manage the park resources and protect the fragile desert soils. The Lake Mead NRA restoration program will continue to work to resolve the issues resulting from illegal ORV use as stated in the park's *General Management Plan* and *Strategic Plan*. Restoration programs will include education, placement of barriers, rehabilitation of disturbed areas, increased signage, and law enforcement.

ALTERNATIVE A- NO ACTION

Natural Resources

Soils and Vegetation

There would be no direct effect to soils and vegetation as a result of the no action alternative.

Cumulative Effects: Soils and vegetation would continue to be impacted in portions of the recreation area from illegal ORV use. Park managers would continue on their present course of responding to problem areas. The knowledge base to preserve the highest priority areas would not be available.

Conclusion: There would be no direct effects as a result of the no action alternative. There would be no impairment to park resources as a result of the no action alternative.

Wildlife

There would be no impacts to wildlife as a result of the no action alternative.

Cumulative Effects: There would be no cumulative impacts to wildlife.

Conclusion: No effect, no impairment.

Air Quality

There would be no impact to air quality as a result of the no action alternative.

Cumulative Effects: Without implementing the preferred alternative, impacts from illegal ORV use would continue and park managers would continue to work to resolve this issue on a case-by-case basis. Dust from vehicular use on approved backcountry roads, and from illegal ORV use in the recreation area would continue to create localized temporary impacts.

Conclusion: No direct impacts would occur to air quality as a result of this alternative. No impairment would occur.

Cultural Resources

There would be no effect to cultural resources as a result of the no action alternative.

Cumulative Effects: There would be no cumulative effect to cultural resources.

Conclusion: No effect, no impairment.

ALTERNATIVE B-PREFERRED ALTERNATIVE

Natural Resources

Soils and Vegetation

No more than twelve study plots would be established under this alternative. At each site, all disturbance would be confined to an area of 50 by 100 meters (0.5 ha). Replicate vehicle tracks would be 20 meters long, totaling 160 meters of tracks at each site. With turning radius included, each site would impact a total of 250 square meters. Up to 24 small excavations could occur on each site, impacting an additional 24 square meters (0.0024 ha). Three soil cores would be removed from each control site, impacting 0.14 square meters (0.000014 ha).

Some vegetation would be removed from the study sites, and some may be crushed by the study, and would likely recover in the long-term. Mitigation would prevent this alternative from creating more than a minor impact to vegetation and soils.

Cumulative Effects: Study results could yield recovery information that enables park managers to make more informed decisions and set priority areas for the protection of the

soils within the recreation area. This could lead to better management and protection of the park resources.

Conclusion: The soils monitoring study would have a negligible to minor impact on soils in the recreation area because even though the impacts are measurable or perceptible, they would occur in a localized, relatively small area. The overall soil structure would not be affected. The soils monitoring study would have a negligible to minor impact on vegetation. There would be only slight measurable or perceptible impacts to vegetation, localized in a relatively small area. The overall viability of the plant community would not be affected and, if left alone, would recover. There would be no impairment to soils and vegetation as a result of this alternative.

Wildlife

Wildlife could be disturbed during the study activities, and they could be temporarily displaced from the project areas.

Cumulative Effects: There would be no cumulative effects to wildlife.

Conclusion: Wildlife would be temporarily displaced from the study area. Overall, these impacts would be negligible as no species of concern is present; and impacts with only temporary effects are expected. There would be no impairment to wildlife as a result of the impacts associated with this alternative.

Air Quality

Dust from the use of dirt roads and from the study itself would be visible during the project. This would occur only during the work period, and would be localized, therefore it would be a minor impact.

Cumulative Effects: No cumulative effects to air quality would occur as a result of implementing this alternative.

Conclusion: There would be minor, short-term localized impacts to air quality around the project site during the work periods. There would be no impairment to air quality as a result of the impacts associated with this alternative.

Cultural Resources

Soil disturbance caused by this project could affect cultural resources. The study plots and access routes will be inventoried for cultural resources. If any cultural resources are located they will be avoided, therefore, there will be no effect to cultural resources.

Cumulative Effects: There would be no cumulative effects to cultural resources.

Conclusion: No effect, no impairment.

SECTION V: COORDINATION AND CONSULTATION

Scoping for the project was initiated August 16, 2002, with a letter to potential interested parties. No comments or issues were raised during the 15-day scoping period.

Public notice of the availability of this environmental assessment was published in local newspapers, and on the Lake Mead NRA Internet Web site (<http://www.nps.gov/lame>). Individuals and organizations could request the environmental assessment in writing, by phone, or by e-mail. The environmental assessment was circulated to various federal and state agencies, individuals, businesses, and organizations on the park's mailing list for a 30-day public review period. Copies of the environmental assessment were made available at area libraries.

The NPS will consult with the appropriate Native American groups as required by the various laws, regulations, and executive orders.

A copy of the environmental assessment can be obtained by direct request to:

National Park Service
Lake Mead National Recreation Area
601 Nevada Way
Boulder City, Nevada 89005
Telephone: (702) 293-8976
Facsimile: (702) 293-8008

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**APPENDIX A: MONITORING PROTOCOLS FOR SOIL STABILITY AT LAKE
MEAD NATIONAL RECREATION AREA**

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APPENDIX B: ENDANGERED, THREATENED, AND CANDIDATE SPECIES OF NEVADA

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